

# Human Factors Engineering Input for Other Process Areas

The following changes are proposed for other process areas (PAs) to reflect some of the salient human factors engineering (HFE) related requirements. These proposed changes represent only a minimum level of the full HFE considerations.

## 1. Process Area 01 - Needs

Page 5-PA 01-1: Under “Base practices list” change the definition of “BP 01.01 Elicit Needs” to include “measures of suitability” so as to read: “Elicit the customer’s needs, expectations, measures of effectiveness, and measures of suitability.”

BP 01.01, Page 5-PA 01-3: Change the definition of “BP 01.01 Elicit Needs” to include “measures of suitability” so as to read: “Elicit the customer’s needs, expectations, measures of effectiveness, and measures of suitability.”

BP 01.01, Page 5-PA 01-3: Under the “Notes” section, in the paragraph on “Examples of techniques to elicit needs...”, add a bullet (in the appropriate order) “results of analyses, studies, or research”.

BP 01.04, Page 5-PA 01-6: Under “Description”, change “operations concept” to “concepts of operation and maintenance”.

## 2. Process Area 02 - Requirements

Page 5-PA 02-1: Under “Major points addressed”, in the first sentence, change “concept of operations” to “concepts of operations and maintenance”.

Page 5-PA 02-2: Under “Notes”, add a paragraph that states: “Especially early in the acquisition lifecycle, there is a tendency to under-estimate the importance of the detailed operational concepts and requirements that impact on or result from human performance and system acceptability considerations. In order to achieve the desired user-centered design and development goals that will contribute to system effectiveness and suitability, appropriate emphasis must be placed on human resource and human-system performance requirements.”

Page 5-PA 02-2: Under “Relationships between this PA and other PAs”, add a sentence to the end of the paragraph that reads: “Use of Human Factors Engineering (PA 24) practices help ensure that human response and human-system performance requirements are adequately addressed.”

Page 5-PA 02-2: Under “Base Practice List”, revise the description of the BP02.03 to include the words “and suitability” after “effectiveness”.

BP 02.01, Page 5-PA 02-4: Under “Description”, revise the forth sentence which ends “for each system element” so as to end as “for each system element (to include the human element)”.

BP 02.01, Page 5-PA 02-4: Under “Description”, add to the end of the last sentence “or emergency operations”.

BP 02.02, Page 5-PA 02-5: Under “Typical Work Products”, add a bullet “human resource (e.g. staffing, training) constraints”.

BP 02.02, Page 5-PA 02-5: Under “Typical Work Products”, add a bullet “human performance objectives or limitations”.

BP 02.03, Page 5-PA 02-6: Revise the description of the BP02.03 to include the words “and suitability” after “effectiveness”.

BP 02.03, Page 5-PA 02-7: Under the third paragraph concerning “examples of requirements related to production and operations”, in the last bullet substitute the words “operators/users and maintainers” for “operators/users”.

BP 02.04, Page 5-PA 02-9: Under “Typical Work Products”, add a bullet “computer-human interface (CHI) requirements”.

### 3. Process Area 03 - Architecture

No changes are proposed for this PA.

### 4. Process Area 04 - Alternatives

Page 5-PA 04-1: Under the paragraph on Major points addressed, in the last line of the last sentence, add “or operational” between the words “technical” and “decision”

BP 04.01, Page 5-PA 04-3: Under the paragraph on “Notes”, in the second line, add “system suitability, usability” between “effectiveness” and “producibility.”

BP 04.02, Page 5-PA 04-4: Under the paragraph on “Notes”, modify the second bullet to add “(including human-in-the-loop simulation)

### 5. Process Area 05 - Outsourcing

BP 05.03, Page 5-PA 05-5: Under the paragraph on “Notes”, add the following: “As a component of the factors affecting solicitation, human factors engineering criteria (quantitative and qualitative) must be appropriately visible and given sufficient weight, consistent with the nature of the program including the degree of human involvement, human-system performance risks, human resource intensity, consequence of error, and the like.”

## 6. Process Area 06 - Software Development and Maintenance

Page 5-PA 06-2: Add a new relationship as follows, "Base practices BP 06.02, 06.03, and 06.07 have direct impact on the humans (system operators and maintainers) that must use the developed software. In performing these practices, the Human Factors Engineering Process Area (PA24) should be considered and applied as appropriate."

BP 06.02, Page 5-PA 06-6: To the list of examples of individuals who review the software requirements document add, "the human factors engineering specialist."

BP 06.03, Page 5-PA 06-7: To the end of the second subparagraph under "Description" add, "Ensure that the software detail design supports human performance in the tasks and activities that the operators and maintainers must perform."

## 7. Process Area 07 - Integration

BP 07.01, Page 5-PA 07-3: Between the first and second sentence to "Notes" add, "Examples of components of human interface specifications include Informational (e.g., displays, content, and media), Cooperational (e.g., individual and team communication), Environmental (e.g., workspace, physical, and psychological), and others."

## 8. Process Area 08 - System Test and Evaluation

Page 5-PA 08-1: To the end of the first sentence under Relationship Between this PA and Other PAs add, "and Human Factors Engineering (PA24)."

Page 5-PA 08-1: Under "Notes" add the sentence: "In assessing potential operational performance issues, emphasis is to be placed upon the system performance when operated or maintained by members of the target population in the intended environment so as to contribute to the identification (and resolution) of human factors causal information."

BP 08.01, Page 5-PA 08-3: Add a new bullet under "Notes" as follows, "identify the human performance requirements to be evaluated."

BP 08.02, Page 5-PA 08-4: Under "Description", 2nd subparagraph, 1st line: Change "user/operator" to "includes the customer/user and maintainer of the system."

BP 08.02, Page 5-PA 08-4: Under "Typical Work Products", add a bullet: "data collection and analysis plans (including human performance data)"

BP 08.03, Page 5-PA 08-5: Add a new bullet under "Description" as follows, "requirements to ensure that the contractor evaluates human performance as a component of the product's evaluation activities."

BP 08.05, Page 5-PA 08-7: In the last sentence of the “Description”, delete "periodically" and add "its usability and" before "the satisfaction of operational requirements."

## 9. Process Area 09 – Transition

BP 09.02, Page 5-PA 09-4: Add a new sentence under “Notes” as follows, “Creating and following a systemic approach and strategy for support of all subsystems and related items assists in responding to the transition requirements while minimizing the changes of, or impact on, personnel resources, training, and support infrastructure.”

## 10. Process Area 10 – Product Evolution

No changes are proposed for this PA

## 11. Process Area 11 – Project Management

Page 5-PA 11-1: In the section “Relationships between this PA and other PAs”, add “and PA 24” to last sentence so as to read “and will coordinate and work with Support Processes (PAs 15-19 and PA 24) throughout the project’s life cycle.”

BP 11.01, Page 5-PA 11-3: In the section “Description”, add “human factors engineering issues” to the second sentence (sixth line) so as to read “... risk management including identifying cost and schedule risks, available and projected technologies, human factors engineering issues, and system testing.”

BP 11.01, Page 5-PA 11-3: In the section “Typical Work Products” add a bullet (in appropriate order) “Concepts of operation and maintenance”.

BP 11.05, Page 5-PA 11-11: In the “Notes” section, under the paragraph on “Examples of technical parameters...”, add a bullet “time and accuracy of task performance”.

BP 11.06, Page 5-PA 11-13: In the “Notes” section, under the paragraph on “Affected groups and individuals...”, add a bullet (in appropriate order) “human factors engineering specialists”.

## 12. Process Area 12 – Contract Management

BP 12.01, Page 5-PA 12-4: In the “Typical Work Products” section, add a bullet (in appropriate order) “human factors engineering planning”

## 13. Process Area 13 - Risk Management

Page 5-PA 13-2: Add “Human Factors Engineering (PA 24)” to list of relationships.

BP 13.02, Page 5-PA 13-4: In the “Notes” second paragraph under the first bullet, add “Human factors engineering” to the serial list of categories of risk.

BP 13.03, Page 5-PA 13-5: In the “Description” paragraph, add to end of the third sentence “...or design of the user/system interface.”

BP 13.03, Page 5-PA 13-5: Under the Notes second paragraph on “Examples of activities to mitigate risks”, add the following bullets:

- “To address the risk that the system will not be acceptable to the user, identify specific points in the development cycle where operators and maintainers provide inputs using rapid prototyping, simulations, and prototype systems.”
- “To address human performance risk, develop a plan to establish HITL performance projections during preliminary design and assess HITL performance during development.”

BP 13.04, Page 5-PA 13-7: Under the “Notes” paragraph, modify first bullet as follows:

- “Hold a meeting of all stakeholders of the project including representative system operators and maintainers to present the risk assessment....”

## 15. Process Area 15 - Quality Assurance and Management

Page 5-PA 15-2: Under the paragraph on relationships between PAs, add “Human Factors Engineering (PA 24)” to second sentence.

BP 15.02, Page 5-PA 15-4: Under the paragraph on “Notes” add a bullet to the Examples of tools to use in measuring the process include:

- Human-in-the-loop simulation and assessments for human response and consequences

BP 15.04, Page 5-PA 15-6: Under the “Description” paragraphs, add to end of the first sentence in the second paragraph “...including the user”.

BP 15.05, Page 5-PA 15-7: Under the Typical Work Products, modify the second bullet:

- failure analysis including human error

## 16. Process Area 16 - Configuration Management

BP 16.02, Page 5-PA 16-5: Under the paragraph on Typical Work Products, add a bullet under the “identified configuration units/items such as”:

- user interface requirements including computer-human interface (CHI)

BP 16.06, Page 5-PA 16-9: Under the paragraph on “Notes”, add: “The specified performance levels are to include human-in-the-loop, where applicable.”

17. Process Area 17 - Peer Review

No changes are proposed for this PA.

18. Process Area 18 - Measurement

No changes are proposed for this PA.

19. Process Area 19 - Prevention

No changes are proposed for this PA.

20. Process Area 20 - Organization Process Definition

No changes are proposed for this PA.

21. Process Area 21 - Organization Process Improvement

No changes are proposed for this PA.

22. Process Area 22 – Training

No changes are proposed for this PA.

23. Process Area 23 - Innovation

No changes are proposed for this PA.

Glossary: Change the term “End User” to include the operator and maintainer.